

# SCIENCE

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## THE PROBLEMS OF COMPARATIVE OSTEOLOGY.<sup>1</sup>

OSTEOLOGY is the study of the bones or the skeleton of vertebrates. Comparative osteology is the study of the origin and evolution of the different modifications of the skeleton. It could also be called "morphology of the skeleton." It not only regards the living forms alone, but considers the fossil forms exactly in the same way. As we know nothing but the skeleton of the extinct vertebrates, comparative osteology becomes the real basis of vertebrate phylogeny. All our systems of vertebrates have to be founded on characters derived from the skeleton. It is quite evident, therefore, that comparative osteology is one of the most important branches of vertebrate morphology. It alone enables us to give an exact and scientific explanation of the origin and evolution of vertebrates, and so it is the real foundation of the morphology of these animals.

Comparative osteology may be divided into three branches: 1. Osteology of the living forms; 2. Osteology of the extinct forms; 3. Evolution of the skeleton.

It is the task of the first-named branch—osteology of the living forms—to study the skeleton of the living forms in as complete a manner as possible. A characteristic genus of each family ought to be examined, and the characters of the families given on this basis. It especially regards such groups of animals as are very isolated to-day, and of the origin of which we know very little or nothing through paleontology. Such animals are, for instance, the *Monotremata*, the ostriches, chameleon, *Necturus*, *Hippocampus*. At the same time it aims to study with great care such forms as in former periods must have been abundant, and which are represented to-day, perhaps, by a single genus only. Such forms are *Hydrax*, *Apteryx*, *Sphenodon*, *Polypterus*, *Ceratodus*, and many others.

There are different ways to work in this branch. One man may give a most complete osteology of a single form, for instance, the chicken; but this purely descriptive work will be of little scientific value in itself, though it will become valuable for him who gets the philosophy out of it, and who traces the relations and origin of the form described. Notwithstanding, such work is very often important, if forms which are very rare or difficult to get are treated in this way. A pure description, for instance, of the osteology of the peculiar tortoise *Carettochelys* from New Guinea, would be very important, because it would enable us to give the correct systematic position to this form. Of the greatest importance is the study of osteological variations in a genus or a species. Darwin's publications in this direction are known to everybody, and Nebring in Germany has devoted much time to it. Such researches ought to be undertaken oftener, as they are of the greatest value for the explanation of the origin of species. Another man may study all the skulls of the members of a family, or an order, or a class, or even of all living vertebrates, and thus give a complete history of the osteology of the skull; or he may treat the vertebræ, the shoulder-girdle, the pelvis, the limbs, in the same way. Such researches are extremely important; but, by considering one part of the skeleton alone, it may happen that parallel forms may be considered as nearly related which in fact have nothing whatever to do with each other.

It is by this method of study that the great homologies of the skeleton have been worked out. Of course, the time of the archetype idea of the skeleton belongs now to the past, or nearly so; but it has been followed by a time which has gone a step too far with its tendency to homologize every thing. In this, great care is necessary. There are elements and formations which have no homologues. I recall the interparietal of mammals. This bone appeared in the mammalian line, doubtless produced by the increase of the brain. It is a new formation in the special branch of mammals which has no homologue among lower vertebrates. When the predentary bone was found in *Iguanodon*, a homologue was eagerly searched for; but this bone is a new formation in the peculiar group of *Orthopoda* to which *Iguanodon* belongs, and has no homologue among lower forms. I could multiply these examples (the tympanic of mammals belongs here, for instance), but I will mention only one other case. There is much said at present about hexa- or hepta-dactylism of the mammalian hand, homologues for the additional digits are looked for among fishes, and we hear about the polydactyl ancestors of mammals; but it is forgotten that mammals came from pentadactyl reptiles, and reptiles from pentadactyl batrachians, and that these rudimentary additional digits in mammals are simply of recent independent origin, and have no homologues. The same is true of the polydactyl forms of ichthyosaurs, of the hexadactyl hind-limb of frogs, and of all higher vertebrates with polyphalangeal digits, as the *Plesiosauria*, *Mosasauroidea*, *Sirenia*, *Cetacea*. It is by studying only one part of the skeleton, without consideration of the others, that such mistakes in homology are made. So it is that the fins of ichthyosaurs were considered for a long time, and by some still to-day, as forming the missing link between fishes and reptiles.

A third man may study the osteology of a group of vertebrates as a whole; for instance, the ungulates, or the parrots, or the crocodiles, or salmon. He will compare all the skulls, the limbs, the vertebræ and so on, of such a group, trying to trace the origin and relation of its members. He will have a big task, but he will get nearest to the truth. But even if he should study the skulls of all living species of vertebrates, or the complete osteology of all living forms, his general results on origin and affinity of the different groups would be very incomplete.

Here paleontology comes in with a helping hand. I mean true morphological vertebrate paleontology, not that old "geological" paleontology. Paleontology of vertebrates, when studied without anatomical knowledge, is of no use: in this case it is generally nothing more than a lumber-room of names of so-called new species or genera, mostly based on insignificant fragments or specimens insufficiently described. That old paleontology should be abolished entirely. A geologist ought to remain in his own domain, geology, and leave paleontology alone, if he is not, what is seldom the case, a thorough anatomist. This is true also of invertebrate paleontology. The splendid publications of Hyatt, Jackson, Beecher, and Clarke, for instance, are written from this standpoint. Vertebrate paleontology is nothing but a branch of comparative osteology, which in itself belongs to vertebrate morphology. It is very remarkable that the museums of natural history are not arranged according to this natural system. Here we find with one exception (the Museum of the Royal College of Surgeons of London) the bones of extinct animals

<sup>1</sup> Abstract of a lecture given by Dr. G. Baur at Clark University, Worcester, Mass., Oct. 17, 1890.

separated from those of the living ones; not only separated in different rooms or parts of the building, but separated in different departments. The bones of the living animals we generally find with the skins or near them. The bones of the fossil forms we find either in a special department or in the geological department. It is absolutely necessary to exhibit the bones of fossil and living animals together in one section.

The morphologist will not waste his time and that of others in giving new names to every miserable fragment of a skull, or a vertebra, or a limb-bone: he will study the fossil forms exactly as the living ones, with the greatest detail. He will take the utmost care to work the bones out of the rock, not leave them to show people how nicely they were embedded in the matrix. How can a man study the bones of living forms if he does not remove the muscles? By treating the fossil bones exactly as the living ones, it is possible to make a direct comparison with the greatest minuteness; and thus alone can we get satisfactory results. How many important extinct forms exist, of the osteology of which we know but little, simply because they have not been worked out sufficiently! I may mention, that, of the triassic *Aetosauria*, a group of two dozen specimens is preserved in a splendid condition; but about this very remarkable order of reptiles we know very little, simply because it has not been worked sufficiently out of the rock.

I stated above, that a man, if he should study all forms of living animals, would get no clear results without paleontology; but very often we find living forms for which we receive no help even through paleontology, the ancestors of which are not yet found. In this case the third branch of osteology comes in,—embryology, or evolution of the skeleton. Of course, in very rare cases only, we can study the evolution of the skeleton of an extinct form; such a rare case is offered, for instance, by the Permian batrachian *Branchiosaurus*, of which Professor Credner has given the development. The evolution of the skeleton of living forms is of the greatest importance for comparative osteology, and I will demonstrate it by a few examples.

We know little about the ancestors of the *Bovidae*; but by studying the evolution of their limbs we find that the earliest embryos show four well-developed metapodials, distinct from each other. Gradually the side metapodials become reduced, and the median ones unite. We can safely say that the ancestors of the *Bovidae* had at a former period four distinct metapodials, which became modified from time to time until the conditions were reached which we see to-day. Another very instructive example is offered by the *Carnivora*, dogs, cats, and so on. In the carpus of the living animals we find that the radial, intermedial, and central are represented by a single bone, but in the embryo we find three distinct cartilages which unite later to form this one bone. This we knew long ago, before we had any idea of these parts in the ancestors of the *Carnivora*; and we could say with confidence that these ancestors must have three distinct bones in the carpus, in the place of one. The limb-bones of some of the *Creodonts*, the ancestors of the *Carnivora*, were discovered subsequently, and showed the three bones.

We know the whole paleontological history of the horse, down to the pentadactyl *Phenacodus* from the lower eocene, but we hardly know any thing about the embryological history of this animal. This, when known, will show the gradual evolution of the peculiar monodactyl foot. Of course, it will not represent the early *Phenacodus* in the earliest embryo (too many generations have gone since the lower eocene, and the embryological history is obscured), but it will doubtless show three well and more equally developed metapodials, and possibly the representative of a fourth one. Here a man could do great service to science by collecting the necessary material in one of the places where the horse has become wild.

But the embryologist has to be sceptical with his conclusions also in osteology. He must never forget that the embryological history is very much abbreviated, and that only the later stages will be indicated in the skeleton of the embryo. But this study is very rewarding, and, in connection with osteology of living and fossil forms, gives splendid views of the origin and evolution of vertebrates. This branch of osteology, I am sorry to

say, has not been treated with the interest it deserves. Embryologists generally stop after they have found out about the formation of the germ-layers. Very seldom an animal is studied up to its adult stage. It is true, the late Professor W. K. Parker has published numerous works on the evolution of the skull of different vertebrates, and these we find cited very often as examples of such a kind of study; but these researches suffer very much from the lack of paleontological knowledge, a number of the statements brought forward are unreliable, and the general conclusions are usually too vague. In these numerous papers we miss the true phylogenetic sense, which alone can lead to true results. Had he, with his great diligence, considered more the results of paleontology and taxonomy, he would have done very much more for the phylogeny of vertebrates.

I can only repeat here, what I said eight years ago in my paper on the "Tarsus of Birds and Dinosaurs:" "Palaeontologie und Entwicklungsgeschichte des Skeletsystems müssen Hand in Hand gehen. Wenn wir palaeontologische Reste studiren wollen, so müssen wir die Skeletogenese des Thieres, welches ihm am nächsten verwandt ist, zuvor kennen. Ich halte daher die Genese des Skeletsystems der Wirbelthiere von eben so hoher Bedeutung, wie die ersten Vorgänge am Ei und die Entstehung der Keimblätter."

Osteology of living forms, osteology of fossil forms, evolution of the skeleton, must go hand in hand. No one of these branches is sufficient in itself: it becomes complete only by the assistance of the two others. So osteology of living forms is deficient without paleontology and embryology of the skeleton; so paleontology is deficient without osteology and embryology of the living forms; so embryology is deficient without osteology of living and fossil forms. All three equally and harmoniously united are able to explain and to unriddle that complicated genealogical tree of vertebrates, with its numerous branches and branchlets, and to conceive the origin of man.

#### REPORT OF THE MARINE BIOLOGICAL LABORATORY AT WOOD'S HOLL.

THE trustees have the pleasure of reporting to the corporation another year of prosperity to the laboratory.

During the last summer those working in the laboratory numbered no less than forty-five, and the tuition-fees amounted to \$959, as against \$845 during 1889, and \$363 during 1888.

During the last summer the laboratory offered greater advantages for study and collecting than ever before, and it may be confidently expected that in the future the receipts from tuition-fees will be even larger. The trustees learn with pleasure that the gentlemen in charge of the department of instruction report that the quality of the elementary students and the work done by them is decidedly better than in previous years.

The two Lucretia Crocker scholarships, of fifty dollars each, were held by Miss A. F. Armes and Miss Nellie L. Shaw, both teachers in the Boston public schools.

During the summer of 1889 the need of a lecture-room was keenly felt. Every available place in the laboratory being occupied by a work-table, it was impossible for students to gather around the lecturer without completely disarranging the laboratory. Experience had also shown that some more advanced students did not need to attend every lecture given, but could spend the time allotted to certain lectures to greater advantage if allowed to continue their laboratory work. This could not be done conveniently while lectures were in progress. Further, in accordance with the plan adopted by the director, evening lectures of a more advanced character were given from time to time. These were attended by both students and investigators, an aggregate of over forty persons. The interest in and instructiveness of these lectures were much marred by the discomforts of the surroundings. The library had also outgrown the quarters to which it was originally assigned, and during the summer of 1889 the number of rooms for investigators was less than the number of applicants.

In view of remedying these defects, the trustees have added an L to the present building. This addition contains a comfortable and convenient lecture-room, a pleasant library, and six investi-

gators' rooms, which, like those in the main building, are fitted with aquaria and supplied with running sea-water. All workers at the laboratory during last summer fully appreciate the advantages gained by this addition.

The library has been considerably enlarged by gifts from numerous friends. Although we were unable to purchase any books, the current subscriptions to journals have been maintained. The following list gives the donations received as far as catalogued: G. Baur, 12 pamphlets; J. N. Coulter, 2 volumes and 2 pamphlets; Stanley Coulter, 2 pamphlets; W. G. Farlow, 2 volumes and 3 pamphlets; C. P. Barnes, J. W. Fewkes, W. F. Ganong, J. S. Kingsley, each 1 pamphlet; Dice McLaren and W. S. Miller, each 1 volume and 1 pamphlet; T. Wesley Mills, 16 pamphlets; C. S. Minot, 15 volumes and 6 pamphlets; Francis Minot, 20 volumes; H. F. Osborn, 7 volumes and 8 pamphlets; A. S. Packard, 9 volumes and 116 pamphlets; Peabody Academy of Sciences, Salem, 5 volumes; Samuel H. Scudder, 1 volume,—a total of 62 volumes and 171 pamphlets. Other gifts were received from A. Agassiz, California Academy of Science, R. Ellsworth Call, C. and R. S. Eigenmann, E. G. Gardiner, Mrs. Gifford, J. E. Ivers, T. H. Morgan, E. S. Morse, W. A. Satchell; but, as these have not returned from Wood's Holl, they have not been catalogued. The most important gift was from Dr. Francis Minot, and included Agassiz's "Contributions" and a series of the publications of the American Academy. The additions go far towards completing our sets of the *American Naturalist* and of the *Botanical Gazette*.

During the former seasons both students and investigators have felt the need of better collecting facilities than the laboratory could offer. Although well supplied with row-boats, the strong tides which prevail in the neighboring waters rendered it imperative for the laboratory to have the use of a steam-launch. Many of the localities where the richest fauna and flora were to be found were beyond the reach of either sail or row boats.

Last spring the trustees supplied this deficiency in the equipment by the purchase of the "Wyandotte," a most excellent launch, designed by Edward Burgess, and in every way suitable to the work. During last summer the "Wyandotte" fully demonstrated her usefulness, dredging and collecting excursions being made every day when the weather was suitable.

Last August the Gifford homestead, which consists of upward of half an acre of land, closely adjoining the lot on which the laboratory stands, and a substantial old house, was advertised at forced sale. The trustees have long believed that in the near future the land and house would be of great value to the laboratory, but have been deterred from purchasing by lack of funds. Appreciating that the amount for which this property could be purchased (thirty-five hundred dollars) was small considering its real value, J. S. Fay, Esq., advanced the money for the purchase, holding a mortgage on the property for three thousand dollars. This generous act secures the property to the laboratory, and at the same time presents the trustees with the sum of five hundred dollars. Since the laboratory was first opened, Mr. Fay has shown by his liberality great interest in its success, and the trustees have once again to thank him most cordially. Their thanks are also due to Professor McDonald, United States commissioner of fisheries, for many courtesies extended by him and his staff to our officers and students.

We are again, as in past years, under obligations to Miss Fay for the use of Gardiner cottage for a mess-room for those working in the laboratory. This last summer the mess was under the immediate charge of one of the officers of the laboratory, and if not in every way satisfactory, yet was on the whole as good as circumstances would allow.

It is hoped that the experience gained will be of service in whatever arrangement may be made another year. The laboratory now owns a complete mess outfit, including tables, chairs, stove, cooking utensils, and table furniture; and it is believed that the house of the newly acquired property can be adapted to a permanent mess-room at small expense.

The trustees believe that the laboratory is now fully equipped; and, until an effort is made to establish a permanent laboratory, but little outlay on improvements will be necessary.

They would, however, again remind the corporation that the success of the laboratory is largely due to the voluntary efforts of the director and his corps of assistants. They have worked faithfully and without further remuneration than their personal expenses while at Wood's Holl. In many cases the work was very arduous, allowing little or no time for study or investigation. It is to be hoped that at least those who give their whole time to the laboratory will in the future receive some compensation.

As the success of the laboratory has greatly exceeded expectation, and warrants the largest hopes for the future, your trustees consider it imperative that an effort be made at once to place the laboratory upon a permanent footing; and they have accordingly voted to take immediate steps to raise sixty thousand dollars, which, when the indebtedness incurred the past season is removed, will yield an annual income sufficient not only to carry it on as heretofore, but to pay a small stipend to those on whose voluntary assistance in direction and instruction we have been dependent for success. The trustees invite your earnest co-operation in securing this amount. The proved usefulness of the laboratory, the great demand for the privileges it offers, and its present far-reaching influence, demonstrate the need for a permanent establishment, and enable us to make our appeal to the public with pride in our brief past, and confidence in our future.

#### AID TO ASTRONOMICAL RESEARCH.

PROFESSOR EDWARD C. PICKERING of Harvard College Observatory has issued a circular (No. II.) on the above subject. A circular was issued last summer, announcing the gift by Miss Bruce of six thousand dollars for aiding astronomical research. No restrictions were made upon its expenditure which seemed likely to limit its usefulness, and astronomers of all countries were invited to make application for portions of it, and suggestions as to the best method of using it.

Eighty-four replies have been received, says Professor Pickering, and with the advice of the donor the entire sum has been divided so as to aid the following undertakings: Professor W. W. Payne, director of the Carleton College Observatory, for illustrations of the *Sidereal Messenger*; Professor Simon Newcomb, superintendent of the American "Nautical Almanac," for discussion of contact observations of Venus during its transits in 1874 and 1882; Dr. J. Plassmann, Warendorf, for printing observations of meteors and variable stars; Professor H. Bruns, treasurer of the *Astronomische Gesellschaft*, to the *Astronomische Gesellschaft* for the preparation of tables according to Gylden's method for computing the elements of the asteroids; Professor J. J. Astrand, director of the Observatory, Bergen, Norway, for tables for solving Kepler's problem; Professor J. C. Adams, director of the Cambridge Observatory, England, for a spectroscope for the 27-inch telescope of the Cambridge Observatory; Professor A. Hirsch, secretary of the International Geodetic Association, to send an expedition to the Sandwich Islands to study the annual variation, if any, in latitude; H. H. Turner, Esq., assistant in Greenwich Observatory, for preparing tables for computing star corrections; Professor Edward S. Holden, director of the Lick Observatory, for reduction of meridian observations of Struve stars; Professor Lewis Swift, director of the Warner Observatory, for photographic apparatus for 15-inch telescope; Professor Norman Pogson, director of Madras Observatory, for publication of old observations of variable stars, planets, and asteroids; Dr. Ludwig Struve, astronomer at Dorpat Observatory, for reduction of observations of occultations during the lunar eclipse of Jan. 28, 1888, collected by the Pulkowa Observatory; Dr. David Gill, director of the Observatory of the Cape of Good Hope, (1) for reduction of heliometer observations of asteroids, (2) for apparatus for engraving star-charts of the "Southern Durchmusterung;" Professor A. Safarik, Prague, for a photometer for measuring variable stars; Professor Henry A. Rowland, Johns Hopkins University, for identification of metals in the solar spectrum.

Of the remaining replies, many describe wants no less urgent than those named above. Some relate to meteorology or physics rather than to astronomy, some to work already completed, and others were received too late to be included. Two important

cases may be specially mentioned. In each of them an appropriation of a part of the sum required would have been made; but in one (in our own country) an active and honored friend of the science undertakes the whole, and in the other (in France) the generous M. Bischoffsheim, already known as the founder of the great observatory at Nice, ignoring political boundaries and the comparative selfishness of patriotism, came forward and gave the entire sum required. It is to be hoped that the above named, and other foreign institutions, will obtain more important aid from neighbors when these become aware how highly the work of their scientists is appreciated in this country. The replies not enumerated above are confidential, and cannot be mentioned except by the permission of the writers; but they have placed Professor Pickering in possession of important information regarding the present needs of astronomers. In several cases a skilful astronomer is attached to a college which has no money for astronomical investigation. He has planned for years a research in the hope that some day he may be able to carry it out. A few hundred dollars would enable him to do this, and he offers to give his own time, taken from his hours of rest, if only he can carry out his cherished plans.

Such valuable results could be attained by the expenditure of a few thousand dollars, that no opportunity should be missed to secure this end. Fortunately, the number of persons in the United States able and willing to give liberally to aid astronomy is very large. It is hoped that some of them may be inclined to consider the case here presented. The income derived from a gift of one hundred thousand dollars would provide every year for several cases like those named above. A few thousand dollars would provide immediately for the most important of the cases now requiring aid. The results of such a gift would be very far-reaching, and would be attained without delay. Correspondence is invited with those wishing to aid any department of astronomy, either in large or small sums, by direct gift or by bequest.

#### HEALTH MATTERS.

##### Small-Pox Extinct in Ireland.

Not a single death from small-pox was registered in Ireland last year, says the *Medical Record*. From this scourge, at all events, "the distressful country" appears to be gradually freeing itself. Over the last ten years the average annual number of deaths was a hundred and thirty, but this average is due to the more serious state of things prevailing in the early stages of the decade. Since 1883 there has only been one year in which the number of deaths from small-pox was as high as fourteen. That was in 1887. In 1885 there were but four deaths from small-pox registered in Ireland; in 1886, two; in 1884 there was only one; in 1888 there were three; and, as above stated, in 1889 there was not one.

#### BOOK-REVIEWS.

*Dragon-Flies versus Mosquitoes. Studies in the Life-History of Irritating Insects, their Natural Enemies, and Artificial Checks, by Working Entomologists.* With an introduction by ROBERT H. LAMBORN, Ph.D. New York, Appleton. 12°.

THIS neat little volume contains the three prize essays elicited by Dr. Lamborn's circular of July 15, 1889, addressed to the working entomologists of the country. The first prize (\$150), as Dr. Lamborn informs us in his introduction, was awarded to Mrs. C. B. Aaron of Philadelphia; the second and third prizes, amounting to \$30 and \$20 respectively, were divided equally between Mr. A. C. Weeks and Mr. W. Beutenmüller, both of New York. The essays were to treat of the best methods of destroying mosquitoes and house-flies with special regard to the agency of dragon-flies.

Taking into consideration the fact that the essays were to be forwarded at the expiration of eighteen weeks from the time the circular was distributed, the three contributions must certainly be regarded as most creditable to their authors. We believe that Dr. Lamborn, at the time of distributing his circular, could have had no conception of the time required to accomplish any thing of practical or theoretical importance on a difficult entomological question.

Large portions of the essays are, as was to be expected, devoted to old and well-established facts in regard to the life-histories, metamorphoses, and morphology of the mosquito, fly, and dragon-fly. These descriptions will be read with interest by all lay readers, whose ignorance of the wonderful life-histories of our most common insects is as glaring as it is inexcusable. But, besides these trite facts, Mrs. Aaron and Mr. Beutenmüller have contributed some points of interest to the specialist. Such are, for instance, Mrs. Aaron's account of her experiments in killing mosquito larvæ and pupæ with petroleum, and Mr. Beutenmüller's carefully prepared preliminary catalogue of the described transformations of the *Odonata* of the world.

Dr. Lamborn's idea of artificially rearing dragon-flies for the purpose of exterminating flies and mosquitoes seems to have met with little favor from the three contributing entomologists. Mr. Weeks concludes that "any attempt to destroy flies and mosquitoes by the artificial propagation of dragon-flies or any other insect would be impossible, unadvisable, and impracticable." Various methods of destruction other than *odonat* culture are proposed by Mrs. Aaron and Mr. Beutenmüller, such as sprayed petroleum (for the larvæ and pupæ), flushing and grading of land, cultivation of fungoids, the employment of attracting-lamps in the neighborhood of marshes, the rearing of fish and the encouragement of water-fowl where fresh water is abundant. It is to be regretted that the circular did not elicit some work on the distribution and systematic study of our North American *Culicidæ*, a branch of dipterology in which no work of any real value has been done; but this could hardly have been expected from the brief time allotted for competition.

The three essays are followed by a letter on dragon-flies as mosquito hawks on the Western Plains, by Mr. C. N. B. Macauley, and a brief article on the extermination of mosquitoes (reprinted from the *North American Review*, September, 1889), by the well-known arachnologist, Professor H. C. McCook. The work is provided with nine plates, one of which is colored, a useful index, and an extended bibliography to Mrs. Aaron's essay.

*Manual Training in Education.* By C. M. WOODWARD. (Contemporary Science Series.) New York, Scribner. 12°. \$1.25.

THIS book contains an exposition of what manual training is, and also an elaborate and somewhat vehement defence of it. The author is director of the manual-training school of Washington University at St. Louis; and the scheme of manual exercises presented in this book is derived in the main from his own practice. Mr. Woodward, however, is by no means disposed to confine manual training to such special schools, but wants to make it compulsory on all the school-children in the country. His arguments are those with which our readers are already familiar. He advocates manual exercises partly as a means of promoting industrial efficiency and thereby helping the rising generation to earn their daily bread, and partly as a means of intellectual culture. The former argument is much the more effective, and the addition of the latter is by no means an advantage. The plea for manual training on the ground that it promotes intellectual culture is very flimsy, and the sooner it is abandoned the better. The present writer has had more than twenty years of manual training and practice in various branches of work from farming to organ-playing, but not a particle of intellectual benefit has he derived from it. As for the culture of the perceptive faculties, about which so much has been said, that is best obtained by the observation of human nature and human life, which are to most persons the chief objects of interest; and this observation goes on spontaneously without the help of teacher or school. What may be the merits of manual training as a preparation for regular industry, and how far its adoption in the public schools is justifiable on that ground, are questions into which we shall not enter here. That special technical schools like that presided over by Mr. Woodward are useful, there can be no doubt; but the success of such schools composed of picked pupils proves nothing as to the expediency of compulsory manual training for all pupils. Meanwhile those who wish to know what manual training is, and what can be said in its favor, will find this book a help.

*The Myology of the Raven (Corvus corax sinuatus). A Guide to the Study of the Muscular System in Birds.* By R. W. SHUFELDT. London and New York, Macmillan. 8°. \$4.

THIS is a very unsatisfactory work, but fortunately of a unique character. According to its contents, it may be divided into three parts. The first consists of a badly arranged and insufficient description of the muscles of the raven, which constitutes the author's own work. In this, not the slightest notice is taken of the valuable papers and monographs of Professors Fuerbringer and Gadow, which form the basis for the morphology of the muscles of birds. The author writes, therefore, from an absolutely antiquated standpoint. The second part is composed of about 70 pages in German, copied from Gadow's recent work on the muscles of birds; and the third, of a bibliography of 144 works. The author prefaces this latter with the words "Important Works and Papers treating of the Muscles of Birds, compiled, abridged, and re-arranged from the Bibliographical Lists of Hans Gadow, and Several Other Sources, as well as Many New Titles added thereto by the Present Writer."

Of these 144 titles, 134 have been copied from Gadow in every detail. A paper of Duvernoy, for instance, is mentioned by Gadow, with the words "Kuerzere Notizen" ("shorter notes"), without giving the long French title. In the author's list this paper appears also under the title "Kuerzere Notizen." The abbreviation of Gadow's list consists in the omission of the very valuable short notes attached to the titles, giving the contents of the paper. It seems to have been too much trouble for the author to translate these notes, which are of such great importance to the student.

Of the ten new titles which are given by the author, four are those of papers which have appeared since Gadow's list was published, three are the titles of little text-books, two have nothing to do with the subject, and one special paper only was published before the appearance of Gadow's list.

In the preface the author says, "To those of my readers who are familiar with German, the best works I can recommend to be consulted in the present connection are the very excellent treatises of Selenka and Gadow in Bronn's 'Klassen des Thierreichs,' and that superb monument to avian morphology, the 'Untersuchungen zur Morphologie und Systematik der Voegel,' of Max Fuerbringer."

We wish the author had studied these works himself before he gave his book into the printer's hands. Perhaps he would have given us something better. But then, we ask, why did the author use and mention, besides his own papers, but 7 of the 144 works of which he gives the titles, in his descriptions? Four of these works are the text-books of Owen, Huxley, Mivart, and Parker: the others are the collected papers of Garrod and Forbes. Milne-Edwards is noted once. From Owen's "Anatomy" the description of the muscles of *Apteryx* is copied, and from the others many a page. The works of such authors as Klemm and Meursinge, who have written specially on the muscles of the raven, are not even mentioned. The explanation is easily given: the author did not take the trouble to read and study the papers the titles of which he gives in the bibliography.

*The Distribution of Wealth.* By RUFUS COPE. Philadelphia, Lippincott. 12°. \$2.

THIS book is another of those ambitious attempts to remedy all the economic ills of society which issue from the press at frequent intervals; and it is about as successful as the rest. The author begins in the usual way by informing us that the distribution of wealth in our day is very unequal, and that sundry evils of more or less portentous import result from this inequality. The facts in the case are set forth with a long array of statistics showing how great the inequality is; and the conclusion is then drawn that this inequality is unjust, and must be remedied. The principal remedies proposed are the abolition or sweeping reduction of interest, the repeal of patent laws, and some not very well defined control of natural and artificial monopolies. To patent laws Mr. Cope has a special antipathy, declaring that "no other single agency, perhaps, except interest on money, is more responsible for the present inequitable distribution of wealth." "Ricardo's law of rent," he says, "appears to be a formula de-

vised as a justification of the rapacity of landlords," yet he is not a disciple of Mr. George. The internal revenue taxes on malt liquors and tobacco he declares to be a great injury to the workmen; but he is very much in love with the protective tariff, and devotes a large space to a defence of it,—a defence very much needed in view of the recent elections. Such are some of Mr. Cope's ideas, but their merits as a solution of the problem in question are not apparent to us.

*Sociology: Popular Lectures and Discussions before the Brooklyn Ethical Association.* By various authors. Boston, James H. West. 12°. \$2.

THE papers in this volume, though containing many points of interest, are not equal in merit to those that came from the same source a year ago. The editor says in his preface that sociology is the name of a new science,—the science of social evolution. Now, whether such a science, as something distinct from history, is possible or not, we shall not here inquire; but it certainly cannot be found in the pages of this book. The various essays it contains are often interesting and sometimes instructive; but they present nothing that can be called a science of social development. Several of them have no relation to social affairs, the remainder being divided between historical topics and methods of social reform. Some of the historical papers are very good; but they are far from presenting a comprehensive view of social evolution, some of the main elements of which are wholly neglected. We read here about the evolution of law and politics, of the mechanic arts, the science of medicine, and some other branches of human activity; but there is nothing about the general intellectual progress of the race, nothing about the evolution of religion and morals or of ideal art, and, strangest of all, nothing about the evolution of language, the instrument that makes society possible. The lectures on social reform present successively the theological method, the socialistic method, the anarchistic method, and the scientific method. That on the socialistic method, by a man who was at first attracted by the socialistic dream, but in the end strongly repelled by it, has been to us the most interesting. The two closing papers are tributes to the memory of Professors Asa Gray and Edward L. Youmans, written with the warmth of friendship as well as of scientific enthusiasm, and describing the services they rendered to science and to education. The discussions that followed the original delivery of the lectures are not reported in this volume, except in two cases; and we regret the omission, as we found those in the former volume on "Evolution" as interesting and suggestive as the lectures themselves.

*Life of Arthur Schopenhauer.* By W. WALLACE. London, Walter Scott; New York, A. Lovell & Co. 16°. 40 cents.

THIS volume is one of the series of Great Writers, of which many numbers have already been issued. It gives a clear and very readable account of Schopenhauer's life, with some notice of his philosophy. The materials for a biography are indeed few; for a philosopher's life is usually uneventful, and Schopenhauer's is no exception to this rule. There were, however, certain peculiarities in his life and character, which lend a somewhat peculiar interest to his biography, and make it read like a mixture of tragedy and comedy. His pessimism is often ludicrous, especially in a man who, after his eighteenth year, had nothing to do but what he chose to do; yet his natural tendency to melancholy, combined with his inordinate passion for fame, made him not only pessimistic in theory, but often really unhappy, in fact. His philosophy was late in winning recognition, and has never attained to much prominence in the world of thought; and it was this failure to win disciples which, more than any thing else, caused his melancholy. He believed that Hegel and other professional philosophers had conspired against him, and he vents on them all the vials of his wrath. Yet his works have undoubtedly received all the favor to which they are entitled, if not more, the exaggerated estimate which he formed of their originality and importance being wholly unjustified. Meanwhile, students of modern philosophy will be glad of this brief biography of the strange author of a strange metaphysical system. His leading work has for some time been accessible in English, while more recently a translation



of some of his shorter works has appeared; and, now that we have a good sketch of his life, English readers can easily learn all they may wish to know of the great pessimist of Germany.

*The Colours of Animals, their Meaning and Use, especially considered in the Case of Insects.* By EDWARD BAGNALL POULTON. (International Scientific Series, Vol. LXVII.) New York, Appleton. 12°.

WITH this volume another new and valuable member is added to the classical International Scientific Series. It comes to us with the fascinating qualities which accurate and well-written accounts of animal life must have both for the general reader and the biologist. Mr. Poulton has given his book a general title, though it treats mainly of the origin of colors in insects, and more especially in moths and butterflies. This use of a general title may be excused on the ground that nearly all the difficulties in explaining the evolution of color in the animal world are met with among insects. After devoting an introductory chapter to the structures in animal tissues whereby colors are produced, the author proceeds to discuss the origin of colors by means of natural selection. Animal colors are classified as non-significant and significant; and the latter category is again subdivided into colors of direct physiological value to the organism (chlorophyl, pigment, etc.), colors of protective and aggressive resemblance, colors of protective and aggressive mimicry, warning colors, and colors displayed in courtship. Each of these classes of significant colors is then taken up in order, and discussed at length, with numerous illustrations drawn mainly from the group of lepidopterous insects. It is impossible in this brief notice to do full justice to the wealth of interesting examples with which the author presents us. Only a very small portion of the work deals with the hackneyed cases of mimicry and protective resemblance found in zoölogical text-books. Many of the observations are original, and others are taken from the recent works of reliable investigators. Perhaps the most original portion of the volume is that which treats of the author's own experiments on the chrysalides of the butterflies. He exposed larvæ to surfaces of different colors during pupation, with results which may be briefly summarized in his own words:—

"I worked upon the allied small tortoise-shell butterfly (*Vanessa urticæ*), which can be obtained in immense numbers. In the experiments conducted in 1886, over 700 chrysalides of this species were obtained, and their colors recorded. Green surroundings were first employed in the hope that a green form of pupa, unknown in the natural state, might be obtained. The results were, however, highly irregular, and there seemed to be no susceptibility to the color. The pupæ were, however, somewhat darker than usual, and this result suggested a trial of black surroundings, from which the strongest effects were at once witnessed. The pupæ were, as a rule, extremely dark, with only the smallest trace, and often no trace at all, of the golden spots which are so conspicuous in the lighter forms. These results suggested the use of white surroundings, which appeared likely to produce the most opposite effects. The colors of nearly 150 chrysalides obtained under such conditions were very surprising. Not only was the black coloring-matter as a rule absent, so that the pupæ were light-colored, but there was often an immense development of the golden spots, so that in many cases the whole surface of the pupæ glittered with an apparent metallic lustre. So remarkable was the appearance, that a physicist to whom I showed the chrysalides suggested that I had played him a trick, and had covered them with gold-leaf. These remarkable results led to the use of a gilt background as even more likely to produce and intensify the glittering appearance. . . . The results quite justified the reasoning; for a much higher percentage of gilded chrysalides, and still more remarkable individual instances, were obtained among the pupæ which were treated in this way."

Warning colors are discussed at some length, and many interesting examples and experimental results adduced. There is a decided antithesis between warning and protective colors; as "the object of the latter is to conceal the possessor from its enemies, the object of the former is to render it as conspicuous as possible." It is shown that warning colors are usually accompa-

nied by a nauseating taste, strongly smelling or irritant fluids, etc. Attention is called to the fact that there is a general similarity in the warning colors of all animals, the prevalent patterns being alternating bands of striking colors, and that consequently enemies soon learn not to attack conspicuous and unusually colored animals, because a few experiments have taught them to associate these striking patterns with disagreeable tastes and odors.

In the chapter on mimicry, more examples, we think, might have been introduced. Many startling cases of *Hymenoptera* mimicked by *Diptera* seem to have escaped the author's notice. The classical case of South American heliconids and pierids, long since described by Bates, really merits fuller treatment than it has received on pp. 232, 233.

The work closes with several very interesting chapters on the colors used in courtship. This is perhaps the most interesting portion of the work, as it deals very successfully with a subject about which there is still wide difference of opinion among zoölogists. Poulton takes his stand with Darwin, and maintains that the peculiar colors, appendages, etc., displayed during courtship by one of the sexes (usually the male) in the presence of the other, owe their origin to sexual selection. This differs from the standpoint taken by Wallace, who denies that the so-called secondary sexual characters thus originate. He maintains that they receive their explanation in natural selection pure and simple. It would be difficult, we believe, to explain many of the facts cited by Poulton, notably Peckham's observations on the courtship of spiders, from Wallace's standpoint.

At the end of the book is given a table illustrating the author's classification of animal colors. Although the Greek derivatives to designate the different uses of colors are well chosen, they will probably not be generally adopted. Zoölogists will probably continue to speak of mimetic rather than pseudoposematic and pseudepisematic colors.

The text is provided with sixty six woodcuts and a chromolithographic frontispiece illustrating a remarkable case of mimicry in South African butterflies.

#### NOTES AND NEWS.

THE College of Physicians of Philadelphia announces that the next award of the Alvarenga prize, being the income for one year of the bequest of the late Senor Alvarenga, and amounting to about a hundred and eighty dollars, will be made on July 14, 1891. Essays intended for competition may be upon any subject in medicine, and must be received by the secretary of the college on or before May 1, 1891.

—A lady, writing to the *British Medical Journal*, says she recently heard a young girl of fourteen years "whistle," as her people called it; but "warble" it really was, for she kept her mouth slightly open, and the lips merely trembled, the notes being formed in the throat, the centre of it working as a bird's does when singing, and the sounds produced were exactly like those of blackbirds and thrushes. She warbled several airs to pianoforte accompaniments faultlessly, and most beautifully modulated; and so powerful were the notes, that her grandmother, who was excessively deaf, could catch every one, without the slightest effort, in another room a little distance off. In the same room some notes were deafening when she poured them out at the *forte* parts. She had been self-taught entirely from "whistling" to her dog and sitting in the window to "warble" to the birds.

—The flora of the Kutais and Tchernomorsk regions, on the eastern coast of the Black Sea, says M. Kuznetsoff in the "Izvestia" of the Russian Geographical Society (*Nature*, Nov. 6), belongs, as already known, to the Mediterranean region of ever-green trees. Next comes the region of West European flora, characterized by the extension of the beech-tree, and offering on the slopes of the mountains the very same subdivisions as one is accustomed to see in the Alps. That region extends over the provinces of Kuban and Terek as far east as the water-parting between the Terek and Sulak Rivers. The territory to the east of it was formerly thought to have a flora more akin to that of Asia, but a distinctly European flora appears again on the eastern slopes

of the Daghestan plateau turned towards the Caspian Sea; while the dry Daghestan plateau itself has a flora decidedly recalling that of the highlands of central Asia. M. Kuznetsoff explains these differences by the moister climate of the Caucasus highlands, due to the proximity both of the Black and of the Caspian Sea. But it may also have a deeper cause. In fact, the plateaus of Daghestan cannot but appear to the orographer as a continuation of the geologically oldest plateaus of Asia Minor, now separated from the main plateau by the relatively much younger chain of the Caucasus. Referring to the vegetation of the Caucasus during the tertiary epoch, when the Caucasus was a vast island surrounded by tertiary seas, M. Kuznetsoff considers that the flora of Daghestan has undergone the greatest change since the tertiary epoch. The floras of both the western and the eastern Caucasus have maintained more of their old characters, owing to less change having gone on in their climate, which has remained moist; and the vegetation of the Black Sea coast, which has a climate very much like that of the Japan archipelago, has retained still more of the aspects it had during the tertiary epoch. Further exploration will be necessary to show how far climate alone can account for the present characters of the flora of the Caucasus.

—Mr. Arthur Winslow, State geologist of Missouri, in his report of the State Geological Survey for October, states that detailed mapping has been continued in the central and south-eastern portions of the State, and about 140 square miles have been covered in Randolph, Howard, Chariton, Johnson, Madison, and St. Francois Counties. During the first half of the month the examination of the clay deposits of the western central counties was in progress; but during the latter half this work was discontinued temporarily in order to make final additions to other work already nearly completed. This work in these counties will be resumed this month with the hope of completing the field-work there this season. Examination of the mineral waters has been made in the following nine counties, and samples for analysis have been collected: Adair, Schuyler, Macon, Daviess, Mercer, Chariton, Pike, Marion, and Ralls. In the laboratory, analyses have been made of mineral waters and clays, and a number of specimens sent in by outside parties have been determined. For the purpose of preparing a preliminary report upon the coal-industry of the State, inspections have been made in Callaway, Clay, Ray, Johnson, Saline, Henry, and Barton Counties. The survey has many applications for information concerning the coal-deposits of the State, and there are no publications on hand with which to satisfy this demand: hence this preliminary report will be prepared for early distribution. It will not be possible to give in such a report all of the valuable detail as to the distribution and character of the coal beds which the final reports and maps are designed to contain; but it will furnish general information relating to the present condition of the coal-industry and its prospective development, concerning which nothing comprehensive and official is available now. Work has also been in progress in Webster and Greene Counties in extension of what was done there last summer.

—*Nature* announces the death of Dr. Alexander John Ellis, F.R.S. The following notice of his career is from the *London Times*: "Dr. Ellis, whose original name was Sharpe, died at his residence in Auriol Road, West Kensington, on Oct. 28. He was born in Hoxton in 1814, and educated at Shrewsbury, Eton, and Trinity College, Cambridge, of which he was elected a scholar in 1835, and graduated B.A., being sixth wrangler, and first in the second class in classics, in 1837. He was elected a fellow of the Cambridge Philosophical Society in 1837, of the Royal Society in 1864 (being a member of the council for 1880-82), of the Society of Antiquaries in 1870, of the College of Preceptors in 1873, and a life governor of University College, London, in 1886. He was president of the Philological Society during 1872-74, and also 1880-82. He was also a member of the Mathematical Society of London, of the Royal Institution, of the Society of Arts, and honorary member of the Tonic Sol-Fa College. Dr. Ellis was a voluminous author, his works including 'The Alphabet of Nature,' 1845; 'Essentials of Phonetics,' 1848; 'Plea for Phonetic Spelling,' 1848; 'Universal Writing and Spelling,' 1856; 'Early English

Pronunciation, with Special Reference to Chaucer and Shakspeare,' 1869-86; 'Glossic,' 1879; 'Practical Hints on the Quantitative Pronunciation of Latin,' 1874; 'On the English, Dionysian, and Hellenic Pronunciation of Greek,' 1877; 'Pronunciation for Singers,' 1877; 'Speech in Song,' 1878; together with numerous other works and tracts on music and phonetics. He received the silver medal of the Society of Arts for three papers in connection with the 'Musical Pitch' at home and abroad."

—The following is a complete list of the papers presented to the National Academy of Sciences, at its meeting in Boston, Nov. 11, 12, and 13: "On the Primary Cleavage Products formed in the Digestion of the Albuminoid, Gelatine," by R. H. Chittenden; "On the Classification and Distribution of Stellar Spectra," by Edward C. Pickering; "On the Relation of Atmospheric Electricity, Magnetic Storms and Weather Elements, to a Case of Traumatic Neuralgia," by R. Catlin; "On the Growth of Children studied by Galton's Method of Percentile Grades," by Henry P. Bowditch; "On Electrical Oscillations in Air, together with Spectroscopic Study of the Motions of Molecules in Electrical Discharges," by John Trowbridge; "Some Considerations regarding Helmholtz's Theory of Dissonance," by Charles R. Cross; "A Critical Study of a Combined Metre and Yard upon a Surface of Gold, the Metre having Subdivisions to Two Millimetres, and the Yard to Tenths of Inches," by W. A. Rogers; "On Evaporation as a Disturbing Element in the Determination of Temperatures," by W. A. Rogers; "On the Use of the Phonograph in the Study of the Languages of the American Indians," by J. Walter Fewkes; "On the Probable Loss in the Enumeration of the Colored People of the United States, at the Census of 1870," by Francis A. Walker; "On the Capture of Periodic Comets by Jupiter," by H. A. Newton; "On the Proteids of the Oat-Kernel," by Thomas B. Osborne; "On the Present Aspect of the Problems concerning Lexell's Comet," by S. C. Chandler; "The Great Falls Coal Field, Montana, its Geological Age and Relations," by J. S. Newberry; "Notes on the Separation of the Oxides in Cerite, Samarskite, and Gadolinite," by Wolcott Gibbs; "On the Relationships of the Cyclopteroidea," by Theo. Gill; "On the Origin of Electro-Magnetic Waves," by Amos E. Dolbear.

—The Brooklyn Institute, through its department of geography, is preparing to open about Jan. 1, 1891, a permanent exhibition of specimens of the best geographical text-books, maps, atlases, globes, reliefs, models, telluria, and other apparatus used in the various countries of Europe and America in their courses of geographical instruction, or required by persons of culture or wealth who equip their libraries with the best geographical material. The plan having been submitted to the foremost educators in this country, to heads of scientific bureaus of the United States Government, and to leaders in business and financial affairs, has received their indorsement, and will have the advantage of their hearty co-operation. The exhibition will be open for one month in the building of the Brooklyn Institute. The collection will then be exhibited for one month in each of the cities of New York, Philadelphia, Boston, Baltimore, Washington, Chicago, St. Louis, and other great centres of population. The entire collection, except loaned specimens, will then be arranged as a permanent exhibition in the building of the Brooklyn Institute. In connection with the exhibition, the Brooklyn Institute is collecting material for a comprehensive report which it will publish regarding the position and methods of geographical instruction in America and Europe. The exhibition will also illustrate lectures to be delivered on the teaching of geography. The exhibition will be free to the public. The collection will be fully catalogued and conveniently arranged for purposes of comparative examination and study. The intention is to illustrate the methods of geographical instruction in all grades, from primary to university, and to give the American public an unequalled opportunity to become acquainted with the best examples of all the various appliances, wherever produced, that are used to illustrate geography. It is desired to make a very prominent department of books that are helpful to teachers of geography. For further information address Cyrus C. Adams, president Department of Geography, Brooklyn Institute, Brooklyn, N.Y.

## SCIENCE:

A WEEKLY NEWSPAPER OF ALL THE ARTS AND SCIENCES.

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Communications will be welcomed from any quarter. Abstracts of scientific papers are solicited, and twenty copies of the issue containing such will be mailed the author on request in advance. Rejected manuscripts will be returned to the authors only when the requisite amount of postage accompanies the manuscript. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guaranty of good faith. We do not hold ourselves responsible for any view or opinion expressed in the communications of our correspondents. Attention is called to the "Wants" column. All are invited to use it in soliciting information or seeking new positions. The name and address of applicants should be given in full, so that answers will go direct to them. The "Exchange" column is likewise open.

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## CONTENTS:

THE PROBLEMS OF COMPARATIVE OSTEOLOGY.....	281	NOTES AND NEWS.....	286
REPORT OF THE MARINE BIOLOGICAL LABORATORY AT WOOD'S HOLL.....	282	EDITORIAL.....	288
AID TO ASTRONOMICAL RESEARCH.....	283	Koch's Discovery.....	
HEALTH MATTERS.		THE AMERICAN FOLK-LORE SOCIETY.....	288
Small-Pox Extinct in Ireland....	284	THE CINQUEMANI "CHRONOLOGE".....	288
BOOK-REVIEWS.		LETTERS TO THE EDITOR.	
Dragon-Flies versus Mosquitoes.....	284	Mohawk Folk-Lore.....	
Manual Training in Education....	284	A. F. Chamberlain.....	289
The Myology of the Raven.....	285	Mount St. Elias and the Culminating Point of the North American Continent.....	
The Distribution of Wealth.....	285	Angelo Heilprin.....	289
Sociology.....	285	Strawberries. T. Greiner.....	290
Life of Arthur Schopenhauer.....	285	Structure of the Plesiosaurian Skull. S. W. Williston.....	290
The Colours of Animals.....	286	AMONG THE PUBLISHERS.....	290

SO FAR AS any definite information has reached this country in regard to the discovery by Koch of a cure for consumption, it appears that the announcement of Koch's discovery was somewhat premature, and that his experiments have not advanced so far as he wished before he would, from preference, have published them. But the interest excited has induced him to make a preliminary statement of results in the *Deutsche medicinische Wochenschrift* for Nov. 14. Even now he simply states that the remedy is a brownish, transparent liquid, which must be injected subcutaneously, preferably on the back between the shoulder-blades and the lumbar region. Small doses do not affect the healthy human being; while with tuberculous patients the re-action consists in an attack of fever, which usually begins with rigors. This is accompanied by pain in the limbs, coughing, great fatigue, and often nausea, the whole beginning four or five hours after the injection, and lasting about twelve. In case of any tuberculous affection on the surface, local re-actions take place, which in the case of lupus result, after one or more injections, in the falling-off of the lupus-tissue, leaving a clean, red cicatrix behind. The symptoms above described occurred in all cases in which a tuberculous process was present, showing the remedy to be at least an aid to diagnosis. In what way the cure takes place cannot as yet be stated with certainty; but Koch believes that the remedy does not kill the bacilli, but the tuberculous tissue, and that it may be necessary to even resort to surgical aid to remove the dead tissue if the organism affected cannot throw it off. Glandular, bone, and joint tuberculosis were similarly treated, with the same result as in lupus, of a speedy cure in recent and light cases, and slow improvement in others. With consumptive patients the dose had to be still further reduced. The results were, that those in the first stage of phthisis were freed from all symptoms of the disease, and might be pronounced cured, patients with cavities not much developed were improved, and only those with large cavities in their lungs showed no improvement in condition. Relapses may occur, of course. A most important point is the need of early application of the method.

## THE AMERICAN FOLK-LORE SOCIETY.

THE second annual meeting of this society will be held in New York City on Nov. 28 and 29, being the Friday and Saturday following Thanksgiving Day. By the courtesy of President Seth Low, LL.D., the sessions will be held in Room 15, Hamilton Hall, Columbia College, Madison Avenue and Forty-ninth Street.

On Friday there will be three sessions for business and reading of papers. At 10 A.M. the council will meet. At eleven o'clock the president, Dr. Daniel G. Brinton, will take the chair, and an address of welcome will be delivered by Professor John S. Newberry, president of the New York Academy of Sciences. The council will then present its report to the society. Reports of officers and committees will be received, and general business will be transacted. At one o'clock the session will adjourn, and the members are invited to a lunch provided by the local committee. At 2.30 P.M. the society will re-assemble for the reading of papers. At 8 P.M., by invitation of the New York Academy of Sciences, a joint meeting of the Folk-Lore Society and the academy will be held in the same hall, at which papers will be read.

On Saturday there will be a single session beginning at 10 A.M. The meetings of the society will be open to the public, but only members will take part in the business and discussions.

The following papers are announced to Nov. 17: Rev. W. M. Beauchamp, D.D., "Hiawatha;" Dr. Franz Boas, "Dissemination of Tales among the Natives of North America;" Dr. H. Carrington Bolton, "Some Hawaiian Pastimes;" Dr. Daniel G. Brinton, "The Worship of Astarte in America," and "The Ethnic Side of Folk-Lore;" Mr. A. F. Chamberlain, "Naniboju among the Ojebways and Mississagas;" Rev. Heli Chatelain, "West African Folk-Lore;" Mr. L. E. Chittenden, "Note on an Early Superstition of the Champlain Valley,—the Whip-poor-will;" Mr. Charles F. Cox, "Faith-Healing in the Sixteenth and Seventeenth Centuries;" Mr. Stewart Culin, "Children's Street Games, Brooklyn, N.Y.;" Rev. J. Owen Dorsey, "Siouan Cults;" Mr. George F. Kunz will make an exhibition of rare objects of folk-lore interest; Professor Daniel S. Martin, "Survival of Superstitions among the Enlightened;" Professor Otis T. Mason, "The Natural History of Folk-Lore;" Dr. John S. Newberry, "The Ancient Civilizations of America, Date and Derivation;" Mr. William Wells Newell, "The Practice of Conjuring Noxious Animals as Surviving in the Folk-Lore of New England;" Dr. Frederick Starr, "The Folk Lore of Stone Implements;" Mr. Louis Vossion, "The Nat-Worship among the Burmese;" Mr. Thomas Wilson, "The Amulet Collection of Professor Belucci, Perugia, Italy, and how it came to be made."

The Wellington Hotel, corner of Forty-second Street and Madison Avenue, will take a limited number of members at favorable rates.—rooms from \$1 to \$2 per day, and meals from \$1.50 to \$2 per day, the hotel being on the restaurant plan. The Wellington is very conveniently situated, being only one block from the Grand Central Depot, and seven short blocks from Columbia College, while three lines of horse-cars pass its doors. Persons desiring less expensive accommodation will find the Kingsborough, 58 West Thirty-third Street, near Broadway, comfortable at \$2 per day (on the American plan).

The committee has made efforts to obtain reduced rates on the railroads centring at New York, but without success, owing to the restrictive regulations of the companies. For further information, address the chairman of the local committee, H. Carrington Bolton, at the University Club, New York City.

## THE CINQUEMANI "CHRONOLOGE."

THIS is a very singular and interesting contrivance. As described by a correspondent of *Nature*, it is a clock with only one toothed wheel, yet it shows the hours, minutes, days of the week, etc., and strikes the hours and quarters at each quarter of an hour. Moreover, there is an arrangement for repeating the hours and quarters at will. The single toothed wheel spoken of is the escape-wheel, and this propels a pair of pallets and pendulum in the ordinary way. The rest of the work is done in the fall of a small leaden ball, a long chain of these balls being intermittently elevated, and one of them discharged over a revolving drum each



quarter of an hour. It is interesting to follow one of these balls through the course of its multifarious duties. It first enters a sling in a tape wound over the escape-wheel axle, and it is the weight of this and three other balls (which have been previously deposited in preceding slings) which keeps the escape wheel going. As the wheel turns round, the balls descend, and after a quarter of an hour the lowest will have arrived at a funnel-shaped opening, where it will get liberated from its sling, and fall. It first strikes a lever which enables the drum to move on and discharge another ball into a sling upon the escape-wheel tape. Then, rushing down a tube, it enters a zigzag. It is within this zigzag that the striking of the quarters is performed; for at each of its angles a bell is placed, against which the ball strikes sharply as it passes them. After leaving this zigzag, the ball is projected down another, where it strikes the hours.

As the number of blows to be struck is regulated by a similar contrivance at each zigzag, we will confine our attention to that for the hours. The channel down which the ball passes is vertical to the face of the zigzag. Now, the front or zigzag side of this channel is a moving tape, which carries a little trap. As the tape is always moving, the position of the trap depends upon the time, and the position of the trap also determines the stage of the zigzag upon which the ball will be projected. Thus, when the trap is opposite the sixth stage of the zigzag, the ball will encounter six corners upon its way down, and consequently six blows will be sounded; when the trap is at the top, twelve blows are sounded; and when the trap is at the bottom, no blows are sounded. When the ball leaves the zigzag, it enters a sling at the lowest part of the chain first spoken of, and is intermittingly carried up again to begin its work over again. For repeating the hours and quarters at will, there is a separate reservoir of smaller balls; and, by pulling a handle, one of these can be discharged above the first zigzag; and when it has done its work, it disappears through a hole, which the regular balls cannot penetrate, back to its own reservoir. It may be mentioned, that, in lieu of bells, the hour zigzag has a single vertical sonorous tube for each set of corners. The time, days of the week, etc., are shown by means of tapes carrying pointers suspended over the escape-wheel and another axle.

The inventor, the Rev. Canon Cinquemani, maintains that the simplicity and precision, by reason of the constant force on the escapement of his "chronologe" (which he has patented), render it peculiarly advantageous for missionary and other distant stations, where the assistance of professional clock-makers is not readily procurable.

#### LETTERS TO THE EDITOR.

\*.\* Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.

The editor will be glad to publish any queries consonant with the character of the journal.

On request, twenty copies of the number containing his communication will be furnished free to any correspondent.

#### Mohawk Folk-Lore.

At various times during the past two years the writer has had opportunity to converse at length with Odjĭdjätėkhă, an intelligent young Indian of the Mohawk tribe residing near Brantford. From him the material given here has been obtained.

*The Child and the Bear.*—Once upon a time a child was left an orphan. A council of his clan was held to consider what should be done with him, and to decide as to whose care he should be given over. Some one (a woman) asked permission to keep him, but soon after allowed him to get astray in the woods, where he was taken up by a bear (the Indians believe that bears are more loving to their offspring than men). The old she-bear had six cubs, and she made the child the seventh. She lived in a hollow log. One day she was out, and the hunters spied her, and, with four dogs with four eyes apiece, they pursued her, and she was just able to reach her hollow log and crawl into it. The hunters shot her and split the log open, and discovered the six cubs, but where was the seventh? After searching for a while, they found it in the end of the log, all safe and sound, and they were sorry for having killed the bear.

The above story is represented as being told by an old man to children. At the conclusion of it, the child asked, "Why are you so afraid now to let us go into the woods where there are bears, if the bears are so kind?"—"Because our love for you is great, and because of the way in which the child came into the bear's possession."

*A Ghost Story.*—Dogs are regarded as giving warning of the approach of ghosts, spirits, etc. One day a dog said to a man that at a certain time the ghosts would come for him, and that he must pack up and be off if he did not want them to get him. If he disregarded the dog's warning, he would be lost. He started, and the dogs, one on each side of him, trotted along, and when he was tired carried him on [how they did this the narrator could not say: the Mohawk word used meant simply "carried"]. Behind them they could hear something flying along, and making a great noise like thunder as it came nearer and nearer. It was the spirit; and when it got too near, one of the dogs would go back and fight it, while the other would go along for a while, and then take his turn at fighting back the ghost. By and by one of the dogs got tired, and said to his master that he could not hold out any longer; and he went back, and the master saw him no more. The other dog, however, kept on, and the man reached home, and on arriving fell down on the threshold. A light was seen, and when the crowd gathered round and questioned him, he said, "I've seen a ghost." The Indians are very much afraid of strange lights, believing them to be ghosts.

*A Dog Story.*—When asked if the Indians ever believed that dogs spoke, Odjĭdjätėkhă said that at Caughnawaga (an Indian settlement in the Province of Quebec), some time ago, a man put his dog out of doors in cold weather. After a while he heard somebody outside saying how cruel and bad it was to keep him out in such very cold weather. He thought it was a man, and opened the door, and saw his dog wagging his tail.

*Thunder and Lightning.*—The Mohawks believe that thunder is caused by seven men, who are up in the sky. Formerly there were only six of them; but once upon a time an Indian got up there, and since then has prevented them from harming Indians. Thus it is that no Indian is ever struck by lightning. When it thunders and lightens very much, the Indians exclaim, "Say, old man, enough of that!"

*Weather-Lore.*—Among the Mohawks the hog is regarded as a sort of weather-prophet. When cold is about to come on, he carries straw in his mouth to make a nest. When a hog is killed, the people examine something in the inside to see what the weather will be. Every year at the Reservation prophecies are made regarding the weather for the following year, and Odjĭdjätėkhă claims that these are often quite successful. The Indians note a good deal about the weather from trees, and from the actions of various animals and birds, such as the muskrat, the woodpecker, etc.

*Feasts, Games, etc.*—The Pagan Cayugas and Onondagas still practice their old dances and other rites. The Onondagas have their white dog feast in the spring. There are also the green-corn dance and the fall dance. The dances of the Pagan Indians are celebrated near Brantford towards the end of January.

The chief games of the Indians are, in summer, lacrosse, and in winter the snow-snake. At a sort of religious festival in the "long house," a game of lacrosse is played by women.

The snow-snake is the chief amusement of the Pagan Indians on Sundays in winter. Odjĭdjätėkhă stated that the snake has been thrown by a skilful player to the distance of from 275 to 375 yards. The Mohawk name for the "snow-snake" is *ăgwădrăhontă*; in Tuscarora, *ătră hontă*; in Onondaga, *hăwhontă*.

A. F. CHAMBERLAIN.

Clark University, Worcester, Mass., Nov. 15.

#### Mount St. Elias and the Culminating Point of the North American Continent.

THE article on Mount St. Elias which Dr. Dall has communicated to your issue of Nov. 14 calls for a reply. In my paper, "Barometric Observations among the High Volcanoes of Mexico, with a Consideration of the Culminating Point of the North

American Continent, published in the current number of the "Proceedings of the Academy of Natural Sciences of Philadelphia," I give what I believe most unprejudiced critics will consider good reasons for doubting the full accuracy of Mr. Dall's measurements of Mount St. Elias (and Mount Fairweather). The reasons for this belief were republished by the editor of *Science* in the issue of that journal of Nov. 7, and need not be restated; but I may be permitted to add that they were formulated two months before the results obtained by Russell and Kerr were made known, which, unfortunately (for St. Elias), only too clearly prove the justice of my doubt, and fortify my statement that the true position of St. Elias is probably "after, and not before, the Peak of Orizaba."

Dr. Dall seeks to throw discredit on my analysis of his measurements by unfavorably criticising my work in Mexico, but I fail to see the relevancy of the citation. He accuses me of being "no geodesist," which I am pleased to admit; but then I am manifestly not far removed from the company of the distinguished naturalist of Washington, since he also sees fit to confess that he makes "no pretence to the character of a geodetic expert." When, however, Dr. Dall wishes to instruct me in the value and deficiencies of an aneroid barometer, I may perhaps be pardoned for looking to other sources for my information; and I would recommend to my learned friend that he acquaint himself more closely with the analyses of the workings of this instrument made recently by German specialists. I append herewith the results of various measurements made in Mexico, which speak for themselves.

#### Peak of Orizaba.

	Feet.
Humboldt (trigonometric).....	17,375
Ferrer (1796, trigonometric).....	17,879
Plowes, Rodrigues, and Vigil (1877, trigonometric).....	17,664
Von Müller (trigonometric).....	18,112
Ratzel (barometric).....	18,069
Kaska (mercurial barometric).....	18,045
Kaska (mercurial barometric, more recent).....	18,300
Doignon (?).....	18,322
Hellprin.....	18,205

#### Popocatepetl.

	Feet.
Humboldt (trigonometric, corrected to Mexican R. R. level-ling).....	17,590
Glennie (barometric).....	17,884
Sonntag (trigonometric, with correction to R. R. levelling).....	17,660
Hellprin.....	17,523

#### Ixtaccihuatl.

	Feet.
Humboldt (trigonometric, corrected to R. R. levelling).....	15,702
Sonntag (trigonometric, corrected to R. R. levelling).....	16,951
Hellprin.....	16,960

#### Nevado de Toluca.

	Feet.
Humboldt (barometric, corrected to R. R. levelling).....	15,038
Height given by Garcia Cubas.....	15,020
Hellprin.....	14,954

The correspondences and divergences may be considered "merely accidental," if it so pleases the critic; but let us contrast with these Mr. Dall's "observations of a higher class" (as compared with previous measurements):—

#### Mount St. Elias.

	Feet.
From 69 miles.....	19,464
From 127 ".....	18,350
From 132 ".....	19,956
From 167 ".....	18,033
Russell and Kerr (1890, as reported in the daily papers) less than.....	15,000
La Pérouse (1786).....	13,000

Possibly the critic will consider these "trigonometrical" results as being also "merely accidental." Mr. Dall wrongly interprets me when he accuses me of broadly stating that the system of "extracting averages" is "delusive." What I object to is the "delusive system of extracting averages." I should perhaps have underscored the first word; but the context, it appears to me, ought to have made my meaning clear. When four measurements of a mountain (Mount Fairweather) give individual results of 15,085, 15,247, 15,447, and 16,009 feet, I fail to see how by any

correct system of extracting averages we can obtain "unanimity" in the general result. It is the making of this unanimity which is a delusion to me.

The scientific world will receive with interest the publication of the results of the recent expedition to Mount St. Elias, and I agree with Dr. Dall that it is best to await the official publication before building too high on preliminary newspaper statements.

ANGELO HEILPRIN.

Academy of Natural Sciences, Philadelphia, Nov. 15.

#### Strawberries.

It needs little proof to show that a long-season strawberry is more desirable than one that yields all its fruit within a week. The great bearers are always among those with a long bearing season. A plant, like a person, can do more work in two weeks than in one. What we desire in a good variety is not only a large quantity of fruit, but also a regular supply during a reasonably long fruiting period. As to pollen-production, I do not think that this is quite as heavy a tax upon the vital energies of strawberry-plants as the Ohio Experiment Station tries to make us believe. Undoubtedly it requires some effort, but there is nothing in analogy to show that the process is an exhaustive one. Nature is quite lavish in the production of pollen. While it is true that Haverland, Warfield, and Crescent—all imperfect-flowering varieties—may be safely put down as our most prolific sorts, this fact may be due to mere accident as much as to "division of labor." I have frequently seen the perfect-flowering Sharpless, Pearl, Capt. Jack, even the Wilson, and others, out-yield by a great deal the best on the list of imperfect-flowering (pistillate) varieties. The Long John, a perfect-flowering sort which originated here twenty or more years ago, has for the past two years equalled, or rather out-yielded, even the far-famed and truly wonderful Haverland.

T. GREINER.

La Salle, N. Y., Nov. 12.

#### Structure of the Plesiosaurian Skull.

IN his recently published "Manual of Paleontology" (p. 1067) Lydekker makes the statement, in his definition of the *Lynaptosaurian* branch, that there are "no ossifications in the sclerotic of the eye," and repeats it in his yet more recent "Catalogue of Fossil Reptilia." Upon this authority, I stated in my recent letter to *Science* that sclerotic plates had not been previously described for this branch, including the *Chelonia* and *Sauropterygia*. This is not correct, as Dr. Baur kindly informs me. He says, "Sclerotic plates are present in the *Testudinata*, as mentioned by Huxley and Hoffmann. I have found them in *Pleurodira*, *Cryptodira*, and *Trionycha*."

I do not wish to say that this character, and certain other ones, such as the co-ossification of the jaws, absence of parietal foramen, etc., are of high classificatory value, but rather that their discovery will require a revision of definitions hitherto given.

S. W. WILLISTON.

Lawrence, Kan., Nov. 12.

#### AMONG THE PUBLISHERS.

THE issue of *Garden and Forest* for Nov. 12 opens with an article on the use of the axe in plantations of ornamental trees. This is followed by an illustrated account of some insect enemies of fruit trees, by Professor Smith, entomologist of the New Jersey Experiment Station. *Celastrus articulata*, a Japanese relative of our climbing bitter-sweet, is described by Professor Sargent, and an excellent figure of the plant accompanies the description. Mrs. Treat writes instructively of evergreens in the pine barrens of New Jersey; and articles on chrysanthemums, asters, and other late-flowering plants, help to make the number seasonable and attractive to every lover of a garden.

—The first edition of "Scientific Lectures," by Sir John Lubbock (London and New York, Macmillan), appeared in 1879. The second edition, now before us, is, so far as we are able to judge, but a reprint of the former. The subjects treated are flowers and insects, plants and insects, the habits of ants, and an introduction

to the study of prehistoric archæology. The volume also contains an address to the Wiltshire Archæological and Natural History Society, and an inaugural address to the Institute of Bankers. Although more than ten years have passed since the first edition was published, the subjects have lost none of their freshness, nor has the manner in which they are handled lost any of its charm or interest.

— *The Chautauquan* for December includes the following articles: "The Intellectual Development of the English People," by Edward A. Freeman; "The English Constitution," III., by Woodrow Wilson, Ph.D.; "How the Saxon Lived," Part III., by R. S. Dix; "The Tenure of Land in England," Part III., by D. McG. Means; "An English Scholar of the Middle Ages," by Eugene Lawrence; and "Studies in Astronomy," II., by Garrett P. Serviss.

— "A Chart of English Literature," edited by George Edwin Maclean, Ph.D., has appeared from the press of Ginn & Co. It is an outgrowth of Professor Maclean's experience in the class-room with a number of classes in the history of English literature, and is, in fact as in name, only a chart, making no pretension to the greater measure of completeness pertaining to the purposes of tables of literature. It covers the whole field, nevertheless, is practical, and will prove useful to students of literature.

— The *Nineteenth Century* for November (New York, Leonard Scott Publication Company) maintains the reputation of this review as the leading English periodical. It opens with a paper by Mr. Gladstone, entitled "Mr. Carnegie's Gospel of Wealth: a Review and a Recommendation." In this article Mr. Gladstone reviews Mr. Carnegie's theories on the use of wealth, and urges the re-establishment of Lord Carlisle's Universal Beneficent Society,—an organization started some twenty-five years ago. In an article on "The Aryan Question and Prehistoric Man," Professor Huxley examines the question of the antiquity of man from a biological standpoint, and finds traces of human existence at a very early time. Prince Krapotkin continues his studies in mutual aid among animals, and brings together many curious illustrations of mutual regard among the lower members of the animal kingdom. Henry Wallis writes on the destruction of Egyptian monuments, which he justly regards as one of the disgraces of our time. He gives a faithful picture of the incalculable damage now being done to some of the most interesting relics of a past civilization. The Hon. Emily Lawless begins a series of papers on old Irish chronicles, the first instalments being devoted to telling the story of the life of Gerald Mor (Gerald the Great), one of the most picturesque figures in Irish history. Dr. J. Paul Richter writes on the guilds of the early Italian painters, and presents a novel picture of the training of artists in the middle ages in Italy. Professor F. T. Palgrave of Oxford contributes an essay on the Oxford literary movements of the fifteenth century, tracing the importance of Oxford in the development of English literature. Three writers briefly discuss the question of the private soldier's wrongs, from as many standpoints. Right Rev. Bishop Barry presents a plea for the loyal feeling in the English colonies, in an article on "The Loyalty of the Colonies." R. E. Prothero writes on French boycotting and its cure. The Right Rev. Earl Grey begins a series of brief political articles entitled "In Peril from Parliament."

— An office has been established in the National Department of Agriculture, one function of which is to collate the work of the agricultural experiment stations of the country, and republish such portions as are of greatest immediate importance in a special farmers' bulletin. The second issue of this bulletin, recently published, contains accounts of experiments on the following subjects: "Better Cows for the Dairy,"—a description of an experiment made by the Massachusetts station, in which records have been kept of the feed consumed and milk produced by twelve cows of different breeds, the experiment extending over five years (it is shown, that, if no allowance be made for the value of the manure, the best cow in the test gave a profit of thirty-six dollars, while the poorest one, with her feed, cost thirty-four dollars more than her produce was worth); "Fibrine in Milk,"—an account in

which Dr. Babcock of the Wisconsin station has shown that there is a substance in milk akin to the fibrine or clot of blood, and that this substance plays an important part in butter-making; "Bacteria in Milk, Cream, and Butter,"—the substance of reports of an investigation made on behalf of the Storrs School station of Connecticut, in which it is shown that these minute organisms, which are found everywhere in the atmosphere, are the immediate cause of the souring of milk, and that milk may be handled with much greater economy by understanding the nature of bacteria; "Silos and Silage,"—a digest of experiments made at the stations of Kansas, Ohio, Michigan, Illinois, and New York; "Alfalfa,"—a report giving full directions for the culture of this plant, with its value as a fertilizer and as food for stock. This summary gives an idea of the contents of these bulletins, which are published for free distribution among farmers, and will be sent to any farmer on request. Address Office of Experiment Stations, Department of Agriculture, Washington, D.C.

— The *American Journal of Archaeology and of the History of the Fine Arts*, Vol. VI. (1890), will contain among its articles of interest the following: "Hittite Sculptures," and "Oriental Antiquities," by Dr. William Hayes Ward of New York; "Antiquities of Phrygia," by Professor William M. Ramsay of Aberdeen, Scotland; "Terra cottas in American Collections," by Salomon Reinach, Museum of Saint-Germain, France; "Reminiscences of Egypt in Doric Architecture," by Professor Allan Marquand of Princeton; "Three Heads of Zeus, Hades, and Poseidon, of the Hellenistic Period," by Professor Adolph Michaelis of Strassburg; "Excavations and Discoveries made by the American School of Archaeology at Anthedon and Thisbe in Boeotia, Greece," by Professor F. B. Tarbell of Harvard University, and Dr. J. C. Rolfe of Columbia College; "Greek Sculptured Crowns and Crown-Inscriptions," and "Distribution of Hellenic Temples," by Dr. George B. Hussey of Princeton; "Norms in Greek Architecture," by Professor Marquand and Dr. Hussey; "The Recently discovered Early Christian Palace under SS. Giovannie Paolo, at Rome," by Padre Germano of the Order of Passionists; "The Lost Mosaics of Rome from the Fourth to the Ninth Century," by Eugene Müntz of the Beaux-Arts, Paris; "Cistercian Monuments as the Earliest Gothic Constructions in Italy," "Roman Artists of the Middle Ages," "Christian Mosaics," and "Tombs of the Popes at Viterbo," by Professor A. L. Frothingham, jun., of Princeton. Being the organ of the Archæological Institute of America, and the medium of direct communication from the American School at Athens, this work has an increasing popularity among general readers as well as specialists.

— In the *Fortnightly Review* for November, issued in this country by the Leonard Scott Publication Company, New York, the new story by Count Leo Tolstoi is brought to a conclusion. An article by Moreton Frewen on "The National Policy of the United States" treats of the recent tariff legislation in this country. The author thinks the McKinley Bill may lose Great Britain Canada, but that it is more likely to cement a Greater Britain not alone of Canada, but also of Australia and South Africa. Sir Lepel Griffin, who published a series of papers on America in the *Fortnightly* a few years ago, writes on "The Burman and his Creed," describing religious life in Burmah and the religious feelings among the natives. Frederick Greenwood, the former editor of the *Pall Mall Gazette*, contributes a careful forecast of the political future of England in an article entitled "The Coming Session: Breakers Ahead." An address delivered to the Chamber of Commerce at Liverpool by H. H. Johnston, on "The Development of Tropical Africa under British Auspices," contains much information as to the possibilities of the Dark Continent and its value to civilized nations. Madame James Darmsteter continues her studies in French medieval life in a paper on "Rural Life in France in the Fourteenth Century," in which she brings together many curious items relating to daily life in the middle ages. A paper by Felix Volkowsky on his life in Russian prisons presents a lifelike picture of existence in Russian prisons by one who spent seven years in solitary confinement and eleven years as an exile in Siberia. This is a thrilling account of actual prison life in Russia, and will doubtless command wide attention. W. H.

Mallock continues his duel with Father Sebastian Bowden on reason and religion in a paper entitled "Reason Alone." Algernon Charles Swinburne contributes a notice of the life and works of the old English poet, Robert Davenport. The number closes with the second instalment of George Meredith's new novel, "One of Our Conquerors."

— One of the most recent additions to the American Book Company's list of schoolbooks is "The Natural Speller and Word Book." The word "natural" in this connection, we presume, relates to an important principle recognized in the higher branches, but too long neglected in the beginnings of school education. In the higher branches this principle is acted upon in showing the intimate relation existing between the various subjects taught, as mathematics, physics, astronomy, chemistry, etc. In this book an effort is made in the same direction by showing the relationship between the words in each lesson. As stated in the preface, "there are a certain number of useful words which the pupil must learn in any event. The question therefore arises whether it is of more benefit to teach him these words abstractly, or to combine them into various exercises which will prove both interesting and instructive." The latter plan has been adopted in this work, and the idea has been well worked out. In addition to the usual methods of calling attention to special letters and combinations by means of bold-faced type, etc., the use of red ink has been tried, and, in our opinion, with unsatisfactory results.

— "Smithsonian Miscellaneous Collections," No. 741, is an "Index to the Literature of Thermodynamics," by Alfred Tuckerman, Ph.D. This is similar to the author's "Index to the Literature of the Spectroscope," published in the thirty-second volume of the same collection for 1888. All of the titles are given in full in the author-index; but in the subject-index, to save useless repetition, only the authors and the places where their works are to be found are given, except in the case of books. Applica-

tions of thermodynamics have been found, and kept, to the number of more than double the titles given, but they were omitted so as not to overload the index with matter of little or no use. No titles, however, have been left out which belong to the applications named in the table of contents. The work has been brought down to the middle of the year 1889.

— "A Woman's Trip to Alaska" is the title of a volume of travels which the Cassell Publishing Company will issue in a few days. The woman who made the trip is Mrs. Septima M. Collis, the wife of Gen. C. H. T. Collis of New York.

— The American publishers of the *Contemporary Review*, the Leonard Scott Publication Company, announce that the November number of that periodical will contain an important note on the personal relations of Stanley and Emin Pacha by Dr. Carl Peters, who gives Emin Pacha himself as the authority for his statements. Josephine Butler will write a graceful tribute to Mrs. Booth, the mother of the Salvation Army, not only describing Mrs. Booth's own part in building up the work of that organization, but pointing out the great good it has accomplished. Arnold White will tell the story of some recent experiments in colonization as gathered from his own observations in South Africa. George Bartrick Baker will contribute a paper on "The Late Crisis on the Stock Exchange," in which he will undertake to point out the causes which have led to the present stringent condition of the money market. Justin McCarthy will review Mr. Lecky's last volumes, the concluding portion of his "History of England in the Eighteenth Century," which are chiefly devoted to the study of the Irish Union. Mrs. Millicent Garrett Fawcett will write on "Infant Marriage in India," and detail the actual life of a Hindoo woman from her cradle. Rev. Dr. Edwin A. Abbott will have a thoughtful and interesting essay on "Illusion in Religion." Sir Thomas H. Farrer will continue his examination into the methods of imperial finance for the last four years. Vernon Lee's Story, "A

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Worldly Woman," will come to a conclusion; and Irish politics will receive consideration in a paper on "The Irish Land-Purchase Bill," by William O'Connor Morris, and a review of the proposed remedies for Irish distress by Michael Davitt.

—A pamphlet has been published in Washington on the subject of "Manual Training in the Public Schools of the District of Columbia." It is purely descriptive in character, and gives a careful and somewhat minute account of the various exercises that have been adopted at the national capital for imparting the training in question. The exercises here described are exclusively for boys, and embrace many kinds of operations in both wood and metal work, as well as in drawing. They are more difficult than some that we have seen described, and demand for their performance a considerable degree of mechanical skill. The text is illustrated by a large number of diagrams, which show better than description can the real character of the work done; and the pamphlet will doubtless be useful to all who are interested in its subject.

—*Scribner's Magazine* during the coming year will publish, among other matter not hitherto announced, "Papers on Japan," by Sir Edwin Arnold (completing the series to be begun in the December number under the title "Japonica"), illustrated by Robert Blum, who was commissioned by the magazine to visit Japan for the purpose, and co-operate with the author. Another literary and artistic contribution to this subject, also illustrated by Mr. Blum during his residence at Tokio, will be two articles by John H. Wigmore, professor in the Tokio University,—one on the popular aspect, and especially on the general celebration, of the inauguration of the new constitution and political order in Japan; and the other on the new parliament and other bodies which are to carry it into effect. Professor James Bryce, M.P., the well-known English publicist, and author of "The American Commonwealth," will write four articles upon India, embodying

the results of his recent journey and a careful study of the country in its social and political aspects, both in itself and its relations to the British Empire. Henry M. Stanley will make an important contribution on an African topic (entirely distinct from his book), with noteworthy illustrations; several papers will also be published, continuing the general subject of Africa, upon which the magazine has printed during the past year, in Mr. Stanley's only article, and in papers by Thomson, Drummond, Ward, and others, the most important articles that have appeared. In an early number will be printed an article by J. S. Keltie, summarizing, with the aid of the African Exhibition just held in London, the great events in the history of African exploration, with a large number of unique illustrations from objects, portraits, etc., lent by explorers and their representatives. There will also be published in the magazine "Latest Explorations of Dr. Carl Lumholtz" (the explorer, and author of "Among the Cannibals"),—papers giving the first account, and the only one to be published in any periodical, of the expedition upon which he is now engaged in a comparatively unexplored region of northern Mexico, in which, it has long been believed by the best authorities, may be discovered descendants of the primitive cave-dwellers and the foundations of the oldest American civilization; several articles upon Australian topics (including "Glimpses of Australia," by Josiah Royce; an article upon the railways of Australia, which, as examples of successful government control, present many novel features; an article on Kangaroo hunting by Birge Harrison; and others); "Ocean Steamships," a short series of fully illustrated articles (somewhat similar, in point of view and treatment, to the railway articles which excited so wide an interest in the magazine in 1889) upon their management, the life and travel upon them, etc.; and "The Seashore,"—four papers by Professor N. S. Shaler, with very copious and rich illustrations from the collections of photographs and drawings, both of the Atlantic and Pacific coasts, made by the author during the last twenty years.

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## CALENDAR OF SOCIETIES.

## Biological Society, Washington.

Nov. 1.—F. V. Coville, Fruiting of the Ginkgo at the Department of Agriculture; George Marx, Investigations of the Poison Glands of Lathrodictus; Joseph F. James, Fucoids and other Problematic Organisms.

Nov. 15.—C. Hart Merriam, Life of the Lava-beds and Cañons of Snake River, Idaho, in October; Theo. Holm, The Vegetative Propagation of *Dicentra cucullaria*; W. H. Dall, Paleontological Notes from the Northwest Coast; F. A. Lucas, A Foot-Disease of Captive Birds.

## New York Academy of Sciences.

Nov. 10.—Alexis A. Julien, On the Microbe of Phosphorescent Wood (illustrated by microscopic preparations).

## Boston Society of Natural History.

Nov. 19.—Nathan Appleton, Santo Domingo (illustrated by the stereopticon).

## Wants.

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